

Interactive comment on “Characterization of ambient aerosols in Mexico City during the MCMA-2003 campaign with Aerosol Mass Spectrometry – Part II: overview of the results at the CENICA supersite and comparison to previous studies” by D. Salcedo et al.

Anonymous Referee #3

Received and published: 14 July 2005

This paper presents an overview of aerosol mass spectrometry measurements made at the CENICA supersite during the MCMA-2003 campaign in Mexico City. In general, it is well written and easy to understand. However, there seems to be some overlap with the first paper in this series and references many papers that are ‘in preparation.’ Rather than giving an overview as is done here, it might be more appropriate to combine parts

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1 and 2 of this series. If the authors feel very strongly that these 2 parts should not be combined, more of an effort to include some of the in preparation work should be made as this would strengthen the paper greatly. As the paper reads now, it appears to just be a report of aerosol concentrations as a function of time (in no way is this statement meant to belittle the work that went into generating the information, as it is recognized how difficult it is to operate an AMS and generate data, but the paper as it stands now lacks some insight and probing analyses). Several issues are discussed in more detail below.

Throughout the manuscript, the authors make several references to nitrate existing in the form of ammonium nitrate. Because there is evidence that soil/crustal material resides in fine material in Mexico City, is it not also possible that the nitrate exists in the fine mode due to uptake on soil? There have been numerous literature manuscripts describing the possibility of this process. The authors state on page 4192 that times when not enough ammonium was present to neutralize nitrate and sulfate could indicate organic nitrates. Are these the times in Figure 3 where it appears that nitrate is not well correlated with sulfate and/or ammonium? Could this data also indicate soil uptake, rather than organic nitrate? Seeing plots of ammonium versus nitrate + 2*sulfate (in equivalents) could help clarify when either organic nitrates or soil nitrates were relevant.

On page 4193, the authors speculate that uniform ozone in the eastern part of the valley is indicative of intense photochemistry despite cloudiness. The authors should actually specify what the mixing ratios were and make a comparison to the mixing ratios representative of Mexico City under different scenarios in order to strengthen their argument.

On page 4193, is the increase in aerosol fraction during the second half of the campaign really clear? There are spikes in the first half of the campaign that are just as high.

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The authors do not discuss Figure 5 in any detail at all.

On page 4195, the authors should define what a ‘good fit’ means. Did they basically perform a multi-parameter minimization technique? Clearly, a lot of previous work shows the appearance of multi-modal behavior for organics. In this case, is this more or less pronounced than in other locations?

A good example of material that could very well be included in this paper is at the top of page 4196. If this is an overview of aerosol results during MCMA and organics make such a big contribution to PM in Mexico City, wouldn't it be relevant to discuss SOA at this point (rather than in a paper in preparation by Dzepina)? Also, the authors (at least some of them) have developed a technique to look at oxygenated versus hydrocarbon-like organic aerosol, which have been argued to be proxies for SOA and POA, respectively. Why not include that analysis here?

On page 4196, line 16, do the growth periods in sulfate observed by the authors in Figure 5 coincide with the measurements of Dunn et al.? The authors state that the relative roles of traffic and nucleation in the ultrafine particle population will be explored in a future publication. Why not here?

In some places, section 3.4 is somewhat redundant with earlier discussions of field campaigns in Mexico City. It would be possible to eliminate some material in the introduction since it is contained in section 3.4.

On page 4198, the authors state that nitrate was higher in MCMA-2003, but on page 4199, the authors state that it is very similar compared to the other campaign. Which is it? Why would ammonium essentially be the same between the campaigns but a switch occur between nitrate and sulfate? Over the course of the 6 years, did ammonia emissions change drastically? If not, then a similar meteorological profile would be expected. Does this then mean that the emissions of SO₂ and NO_x are vastly different? Since the comparison between the two campaigns is, at best, qualitative, the authors should make more of an effort to compare meteorology and emissions scenarios to

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explain the differences.

On page 4201, lines 10-13 in the conclusion. The authors state about the aerosol species: 'have diurnal cycles that can be qualitatively interpreted as the interplay of (some or all of) direct emissions, photochemical production, etc., etc.' This statement really can't be any more general. All atmospheric species are influenced by all of these processes. How much each of these processes matter is the more interesting part, and the authors should at least attempt to estimate the role that each plays.

Below is a list of editorial suggestions: Page 4186, Line 20, capitalize c in City Page 4188, Line 19, no semicolon needed Page 4200, line 9, should specially be especially? This is also a bit of a run-on sentence. In Table 1, are organic compounds represented as metric tons of C? Figure 4h is rather difficult to read It is probably possible to combine Figures 6-8.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 4183, 2005.

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